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(54) Moulding apparatus with compensation element

(57) The invention relates to a moulding apparatus for moulding a chip on a flat carrier (4), comprising a mould formed by two mould parts (2,3) which are movable relative to each other and between which the carrier (4) can be received, the one mould part (3) of which is provided with a mould cavity against the peripheral edges of which the carrier (4) can be pressed, and means for exerting pressure in at least one cavity for moulding material arranged in the mould and connected to the mould cavity by means of a runner, wherein at least one compensation element (11) is arranged whereby in the closed position of the mould parts one side of the carrier (4) is held sealingly against the peripheral edge of the mould cavity.

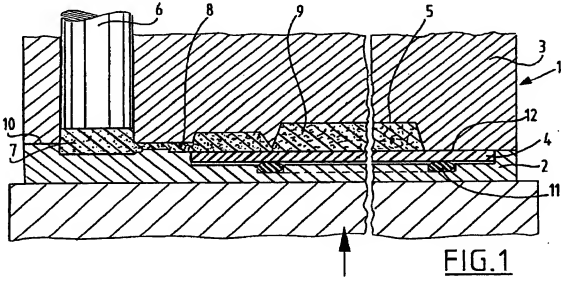

FIG.1

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Fig. 1 shows a moulding apparatus 1 in which a carrier 4 is received between two mould parts 2, 3, on which carrier is arranged a chip for moulding (not shown in this figure). In the upper mould part 3 is arranged a mould cavity 5 in which a covering element 9 can be arranged through a runner 8 by exerting pressure on moulding material 7 using a plunger 6. In order to prevent moulding material 7 leaking to the outside at a parting 10 between the mould parts 2, 3, the mould halves 2, 3 must connect together precisely. For this purpose the mould parts 2, 3 are pressed against each other with a predetermined force F. To now also ensure that the carrier 4 is enclosed non-movably between the mould parts 2, 3, i.e irrespective of differences in thickness of the carrier 4, a compensation element in the form of a spring ring 11 is arranged in the lower mould part 2. This spring ring 11 presses the carrier 4 against a peripheral edge 12 of the upper mould part 3.

Fig. 2 shows an alternative moulding apparatus 13 in which a lower mould part 14 is provided with a mould cavity 15 and, communicating therewith, a runner 16 which is then connected to a supply device 17 for moulding material. An upper mould part 18 comprises two segments 19, 20 movable relative to each other. The segments 19, 20 are mutually connected with interposing of springs 21. The mould parts 14, 18 close precisely onto each other close to the supply device 17 irrespective of the thickness of a carrier 22. The force exerted on the carrier 22 by the segment 20 as according to arrows P depends on the spring constants of the springs 21. The springs 21 thus determine with what force the carrier 22 is pressed against the lower mould part 14, without this having to depend on the thickness of the carrier 22, wherein the thickness of the carrier 22 also has no influence on the connection of the mould parts 14, 18 close to the supply device 17 for moulding material.

Fig. 3 shows a moulding apparatus 23, wherein as according to the previous figure a mould cavity 15 is arranged in the lower mould part 14, against the peripheral edges 24 of which cavity is pressed a carrier 22. Between the carrier 22 and an upper mould part 25 a layer of resilient material 26 is arranged. The layer of resilient material 26 herein forms the above mentioned compensation element for differences in thickness of the carrier 22. The layer of resilient material 26 can therein be fixedly connected to the upper mould part 25, can be arranged separately between the carrier 22 and the upper mould part 25 or can be fixed to the carrier 22 as shown in fig. 4.

A carrier 27 shown in fig. 4 is provided on the side remote from the chip for moulding with a releasable layer of resilient material 26. The layer of resilient material 26 must be removable after the moulding operation since the layer 26 covers contact points 28 which are of great importance for later operation of the moulded chip. An additional advantage of this embodiment is that the contact points 28 are protected by the layer of resilient material 26 during the moulding operation.

Fig. 5 shows a moulding apparatus 29 similar to the moulding apparatus 13 shown in fig. 2, wherein the upper mould part 18 comprises a number of segments 30, 31 which are all connected to a central holding plate 34 with interposing of springs 32, 33.

Fig. 6 shows a moulding apparatus 35, of which a segment 36 is connected to a holding plate 34 with interposing of a clamping device 37. The segment 36 is urged further downward relative to holding plate 34 by displacing a beam 38 as according to arrow T. Depending on the force exerted in the direction of arrow T, it is possible to vary the force which segment 36 exerts on carrier 22. The embodiment of the beam 38 shown here has of course many alternatives. A wedge-shaped element can be envisaged here for instance. With this preferred embodiment it is also possible to move mould part 14 and segment 19 to within a short distance of each other in order to effect the definitive connection of segment 19 to mould part 14 after the segment 36 has already been brought into contact with carrier 26.

Fig. 7 finally shows a moulding apparatus 39 wherein a segment 40 forms part of an upper mould part 41. The segment 40 has a form such that it only engages the carrier 22 along one edge. This prevents the clamping force on the edge of the carrier 22 becoming too great in the case of a relatively thick carrier 22. A middle segment 42 fixedly connected to holding plate 34 exerts a pressure which is not dependent on the thickness of carrier 22. However, in the region where the middle segment 42 exerts pressure on carrier 22 the latter is less sensitive and can thus withstand a greater clamping force here. The advantage of this embodiment is that the pressure exerted by the moulding material has less influence on the pressure exerted by the segment 40.

Claims

1. Moulding apparatus for moulding a chip on a flat carrier, comprising a mould formed by two mould parts which are movable relative to each other and between which the carrier can be received, the one mould part of which is provided with a mould cavity against the peripheral edges of which the carrier can be pressed, and means for exerting pressure in at least one cavity for moulding material arranged in the mould and connected to the mould cavity by means of a runner, wherein at least one compensation element is arranged whereby in the closed position of the mould parts one side of the carrier is held sealingly against the peripheral edge of the mould cavity.

2. Moulding apparatus as claimed in claim 1, **characterized in that** in the closed position the mould parts are urged against each other under a predetermined force.

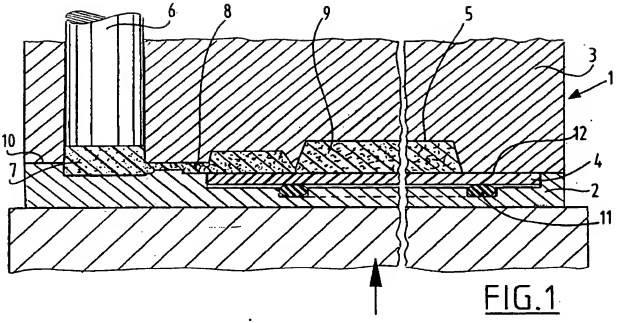

FIG.1

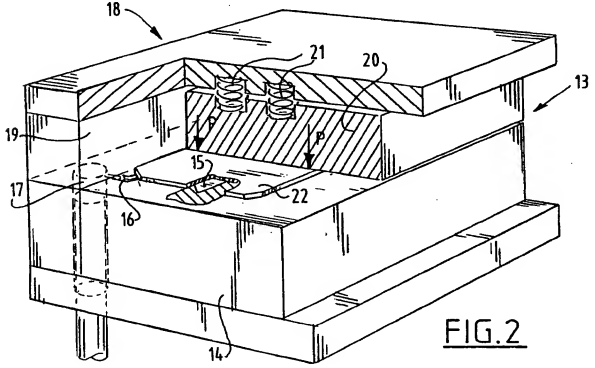

FIG.2

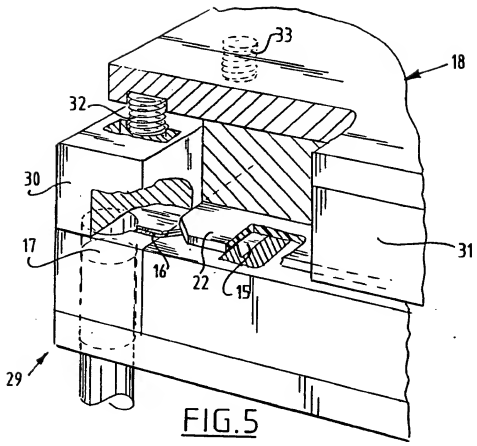

FIG.5

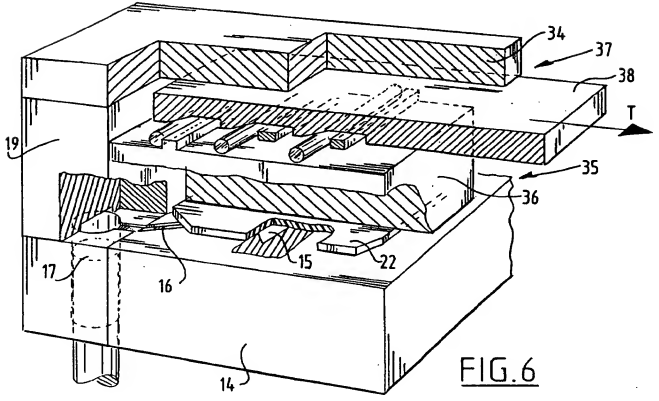

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 0045

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 661 (E-1471), 7 December 1993 & JP-A-05 218508 (SHARP CORP), 27 August 1993, * abstract * ---	1,2,6	H01L21/56
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 488 (E-1277), 9 October 1992 & JP-A-04 179130 (HITACHI TOKYO ELECTRON CO LTD), 25 June 1992, * abstract * ---	10,11	
X	PATENT ABSTRACTS OF JAPAN vol. 018, no. 317 (M-1622), 16 June 1994 & JP-A-06 071685 (TOSHIBA CORP), 15 March 1994, * abstract * -----	1,2,5,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 May 1996	Zeisler, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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